

**ABSTRACT OF THE DISCLOSURE**

A system for measuring density of material which can be embodied to measuring bulk density of material penetrated by a borehole. The probe component of the system comprises a source of neutron radiation and preferably two gamma ray spectrometers. The neutron source induces gamma radiation with energies up to about 10 MeV within the material being measured. Formation bulk density is determined by combining spectra of the induced gamma radiation with preferably two gamma ray spectrometers at differing axial spacings from the source. The high energy and dispersed nature of the induced gamma radiation yields greater radial depth of investigation than that obtainable with prior art backscatter density systems, which typically use gamma ray sources local to a probe and of energy about 1.3 MeV or less. The system can alternately be embodied to measure other material properties and to measure density of materials not penetrated by a borehole.